

## Tobacco-Related Cancer Incidence in Rhode Island and the United States

Leanne C. Chiaverini, Jay S. Buechner, PhD,  
and John P. Fulton, PhD

Previous analyses<sup>1,2</sup> on three decades of cancer mortality in **Rhode Island (RI)** and the **United States (US)** found that age-adjusted mortality rates for tobacco-related cancers fell slightly for RI males and rose for RI females in the 1990's compared to the 1970s and 1980s. In addition, the percent elevation (RI rate relative to US rate) in tobacco-related cancer mortality among males decreased from the 1970s to the 1980s but did not change from the 1980s to the 1990s. The percent elevation among females increased in each decade from the 1970s to 1990s, but was lower than the elevation among males. In the 1990s, tobacco-related cancer mortality rates in RI were 10 percent higher among males and 6 percent higher among females when compared to the US.

A closer analysis of tobacco-related cancer trends in the most recent decade has produced noteworthy findings. This report presents data on the patterns of tobacco-related cancer mortality and incidence since the establishment of the Rhode Island Cancer Registry in 1987, through 1999, with comparison to US data. Data on historical patterns of cigarette smoking for both areas are also presented to examine the correlation with this important risk factor.

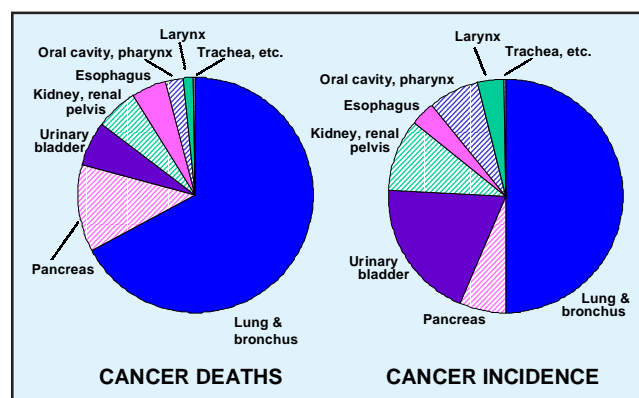
**Methods.** Following previous studies,<sup>1,2</sup> cancers of the following anatomic sites were considered to be "tobacco-related:" lung-bronchus, urinary bladder, kidney and renal pelvis, oral cavity and pharynx, esophagus, pancreas, larynx, and trachea, mediastinum and other respiratory organs.

RI and US cancer mortality rates for 1987-1999 were obtained from the Centers for Disease Control and Prevention's WONDER system.<sup>3</sup> RI cancer incidence rates for 1987-1999 were obtained from the RI Cancer Registry and US cancer incidence rates for 1987-1999 were obtained from the National Cancer Institute, SEER Cancer Statistics Review.<sup>4</sup> All rates were computed for males and females, including all races, and were directly standardized for age, using the 2000 population of the US as the standard population. For trend analysis, annual rates are presented as three-year moving averages and expressed as "average annual deaths [mortality] or cases [incidence] per 100,000 population per year." The percent elevation of tobacco-related cancer rates in RI was calculated relative to the corresponding US rates.

Data on the rate of current cigarette smoking among RI males and females were obtained from the RI Health Interview Survey,<sup>5</sup> a periodic telephone survey of approximately 2,600 households including 6,500 individuals per iteration. (Data for 2001 are preliminary data subject to change.) Comparable smoking rates for the US were assembled from published data from the National Health Interview Survey.<sup>6</sup> For both sources, a "current smoker" is defined as a person who has smoked at least 100 cigarettes and who now smokes.

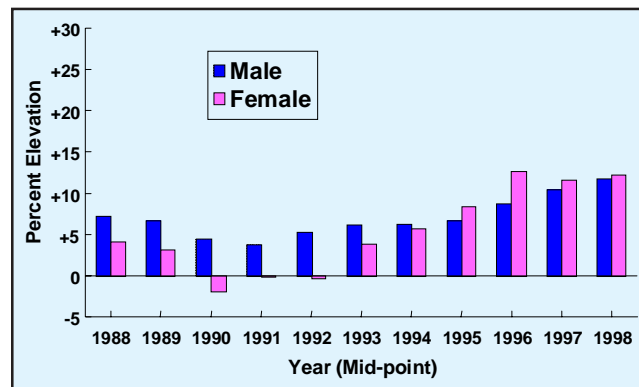
**Results.** The distribution of anatomic sites contributing to tobacco-related cancers differs for cancer mortality and incidence.

In 1999, cancer of the lung and bronchus was responsible for the largest proportion of tobacco-related cancer mortality (67 percent) and incidence (50 percent) in RI. (Figure 1) Cancers of the pancreas and urinary bladder were, respectively, the second and third leading sites among tobacco-related cancer deaths in RI, while the second and third largest sites for tobacco-related cancer incidence were cancers of the urinary bladder and of the kidney and renal pelvis.



**Figure 1.** Cancer mortality and incidence by anatomic site, Rhode Island, 1999.

Consistent with earlier findings,<sup>1,2</sup> RI age-adjusted tobacco-related cancer mortality from 1987-89 to 1997-99 fell slightly for males (-5%) and rose for females (+22%). Relative to the US, the percent elevation of RI tobacco-related cancer mortality decreased in the late 1980s then increased in the 1990s. (Figure 2) During the most recent decade (between 1989-91 and 1997-99), the percent elevation rose from +4% to +12% among males and from -2% to +12% among females.

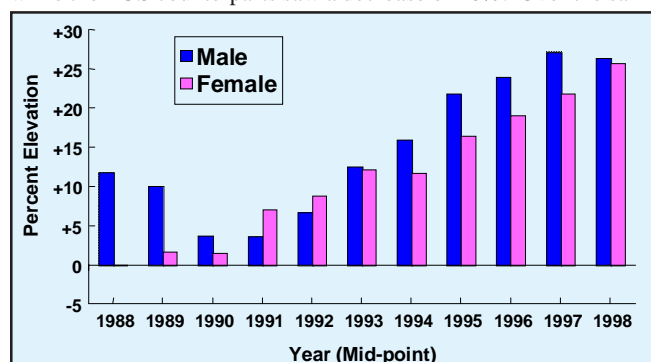


**Figure 2.** Elevation of Rhode Island mortality per 100,000 population (age-adjusted) relative to US mortality, tobacco-related cancers, by sex, 1988 - 1998 (three-year moving average)

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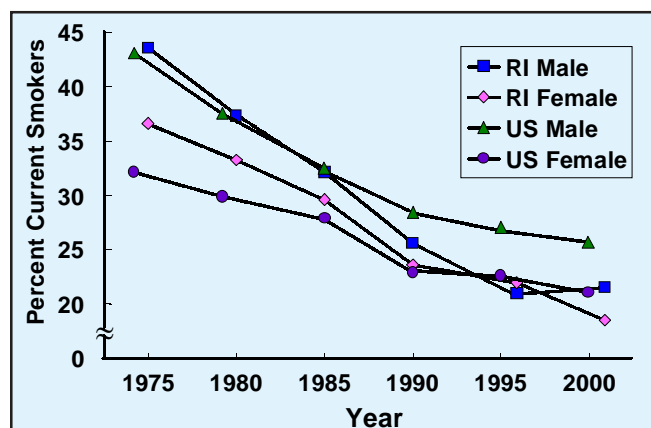
## Health by Numbers

The age-adjusted tobacco-related cancer incidence rate among RI males was virtually unchanged from 1987-89 to 1997-99 (+1%) while their US counterparts saw a decrease of 10%. Over the same



**Figure 3.** Elevation of Rhode Island incidence per 100,000 population (age-adjusted) relative to US incidence, tobacco-related cancers, by sex, 1988 – 1998 (three-year moving average)

period, the RI rate among females increased by 35%, while the rate among US females increased by 7%. During the most recent decade, RI male rates relative to the US rose from an elevation of +4% in 1989-91 to +26% in 1997-99, and the percent elevation among females rose from +2% in 1989-91 to +26% in 1997-99. (Figure 3) Among both males and females, the RI vs. US elevation of cancer incidence in 1997-99 was more than double the percent elevation for cancer mortality.



**Figure 4.** Percent current cigarette smokers, RI and US, 1974 – 2001.

The percent of current smokers in both RI and the US has steadily declined since at least 1975. (Figure 4) From 1975 through 1985, RI males had smoking rates similar to those for US males; since 1990, their rates have fallen below US rates. RI females have

smoked more than US females historically, but the large differential observed in 1975 (36.6% in RI vs. 32.1% in the US) had disappeared by 1995-6 (21.9% in RI vs. 22.6% in the US).

**Discussion.** Tobacco-related cancer mortality and incidence in RI relative to the US has become increasingly elevated over the past decade. In RI relative to the US, mortality attributed to tobacco-related cancers is elevated by 12% for both males and females as of 1997-99, while incidence is elevated by 26% for both males and females. This has occurred despite significant improvement in smoking rates in Rhode Island, both absolutely and when compared to the US.

The incidence of tobacco-related cancers in Rhode Island needs to be investigated further, both because the incidence data do not correlate with historic smoking patterns in the state and because they are not fully echoed in mortality rates. Some areas proposed for study are — (1) Changes in the population of the state: Are some of the observed patterns due to changes in the race and ethnicity composition of the population or to differential out-migration of non-smokers over time? (2) Accuracy of the data on smoking rates: Has the smoking data for the state been collected comparably over the period for which such data are presented, given declining participation rates in telephone surveys and other effects? (3) Detailed smoking patterns: The prevalence of former smokers and the amount smoked by current and former smokers may explain part of the observed patterns of incidence and mortality. (4) Non-tobacco risk factors: All of the cancer sites included in the definition of tobacco-related cancers are also related to other risk factors, such as occupational and environmental exposures, which impact urban dwellers. Are the incidence rates responding to changes in these other risk factors? It is likely that such further investigations will produce a number of factors that have contributed to the observed increase in cancer incidence over the past decade.

Leanne Chiaverini is Research Associate, Division of Disease Prevention and Control, Rhode Island Department of Health.

Jay S. Buechner, Ph.D., is Chief, Office of Health Statistics, and Clinical Assistant Professor of Community Health, Brown Medical School.

John P. Fulton, PhD, is Associate Director, Division of Disease Prevention and Control, Rhode Island Department of Health, and Clinical Associate Professor of Community Health, Brown Medical School.

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